

Activity 1

Taking a Ride on a Lithospheric Plate

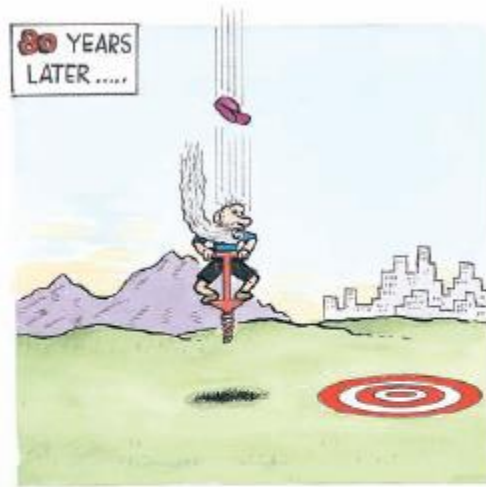
Think About It

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- How can you locate your position on the Earth's surface?
- How would you be able to determine whether your position on the Earth has moved?



WHAT DO YOU THINK?

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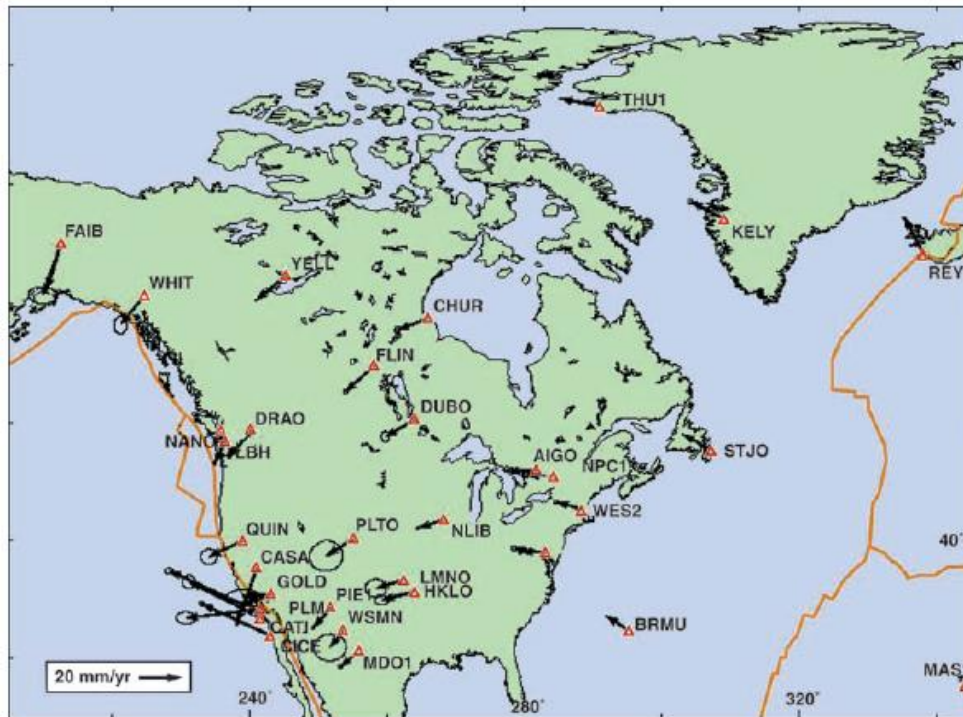
Taking a Ride on a Lithospheric Plate

Investigate Part A

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1a. How do you know that the WES 2 station has moved over time?

1b. In what compass direction is the WES 2 station moving? Be specific.

1c. Is the WES2 station moving more than or less than 20 mm/yr? Explain.

1d. Are all stations on the map moving at the same speed? Explain.

1e. Are all stations on the map moving in the same direction? Explain.

1f. What is the general or average direction of movement of North America?

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Digging Deeper

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Learning Objective: In writing, SWBAT sequence and describe layers of Earth using academic language

Crust

the thin outermost layer of the Earth

Continental crust

is thick and usually very old

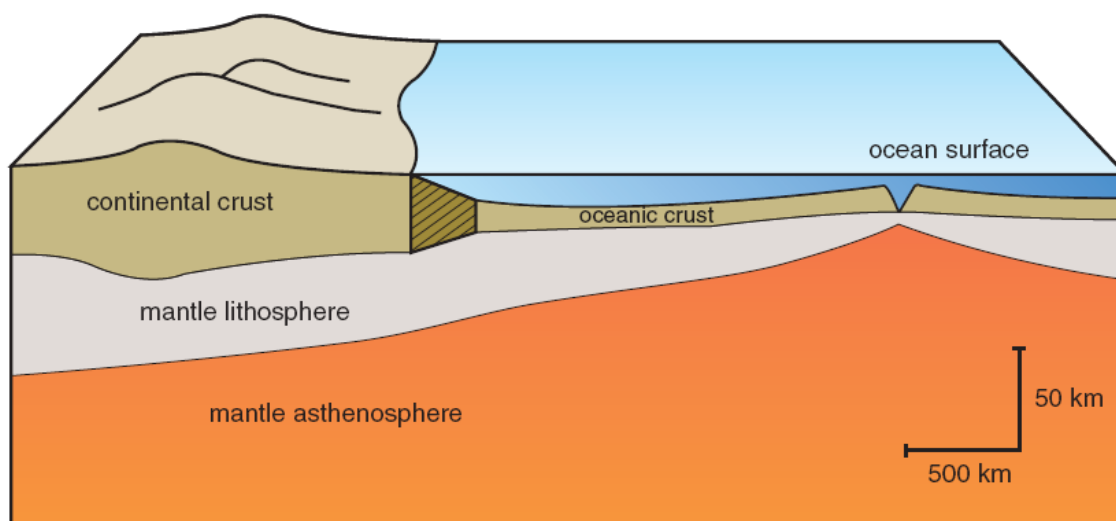
Oceanic crust

is relatively thin, and is always younger than continental crust

Ocean crust is denser than continental crust

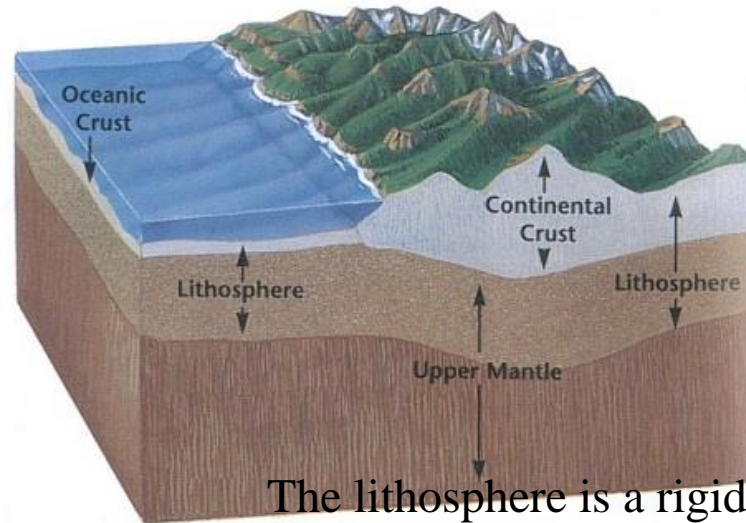
Mantle

the zone of the Earth below the crust and above the core



Lithosphere

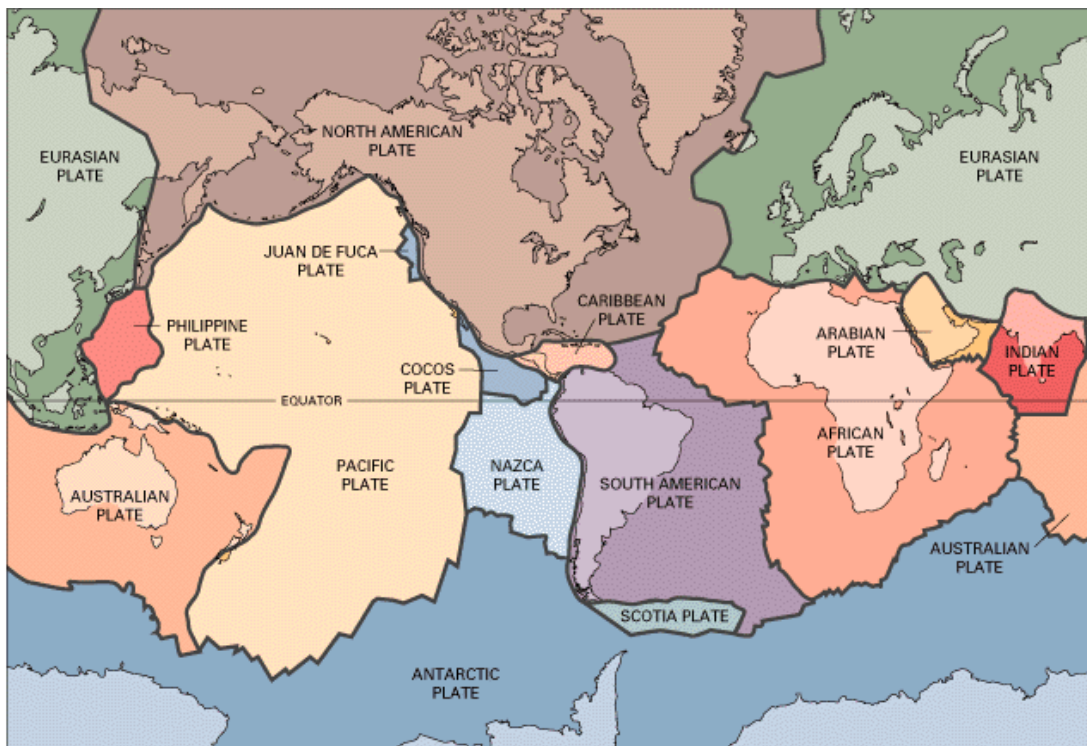
the outermost layer of the Earth, made of the Earth's crust and part of the upper mantle



Tectonic plates

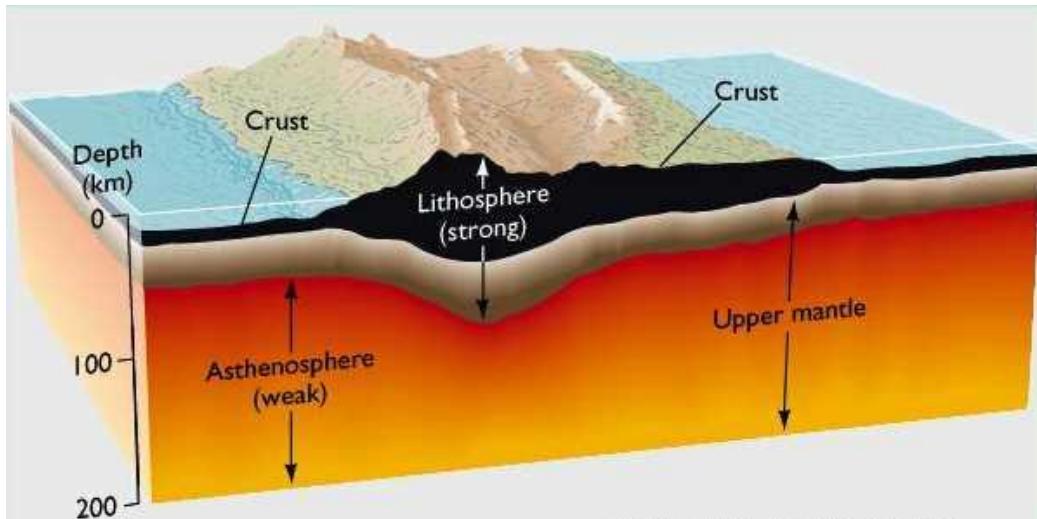
The lithosphere is a rigid layer
The Earth's plates are made up of the lithosphere
pieces of Earth made mostly of lithosphere

The less dense plates of the lithosphere “float” on the denser asthenosphere



Asthenosphere

the part of the mantle below the lithosphere that is like hot plastic and flows slowly



GPS

Global Positioning System

It is a satellite system that locates points on the Earth

Data from GPS satellites confirm that the surface of the Earth is moving

Learning Objective:

In writing, SWBAT describe the theory of seafloor spreading and explain evidence that supports it using academic language

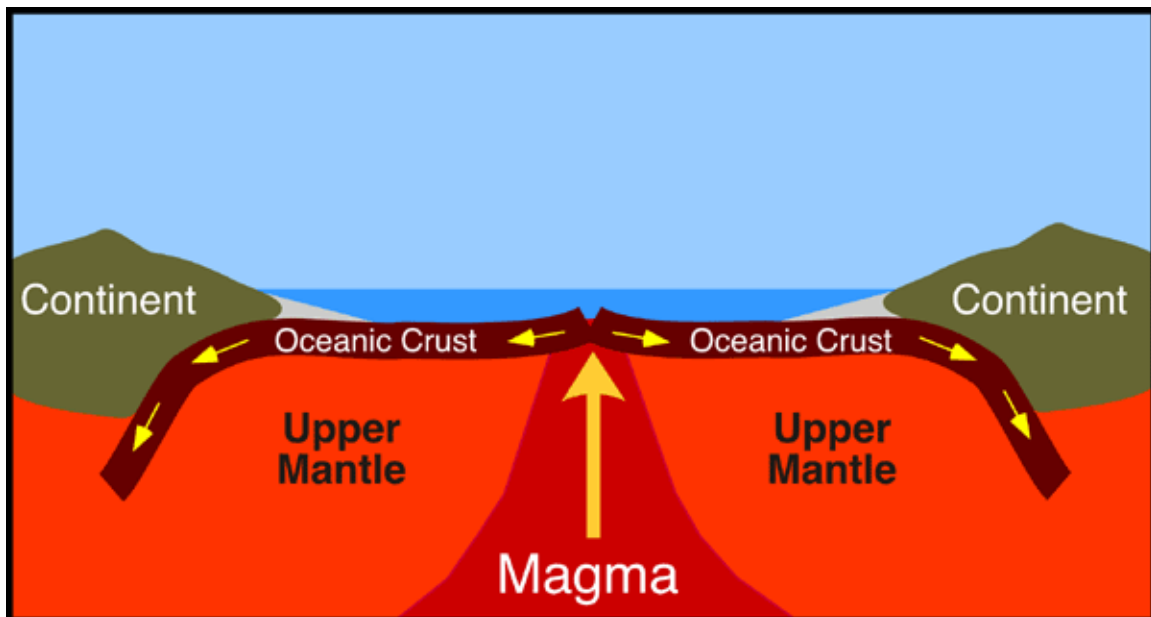
Seafloor spreading

the theory that the ocean floor spreads apart as new ocean crust is formed

How seafloor spreading happens

below a mid-ocean ridge, magma from the mantle rises up and pours out of cracks in the ocean crust
The cooling magma forms new seafloor in the center of the ridge

As the seafloor moves away from the mid-ocean ridge, it cools and becomes denser and sinks



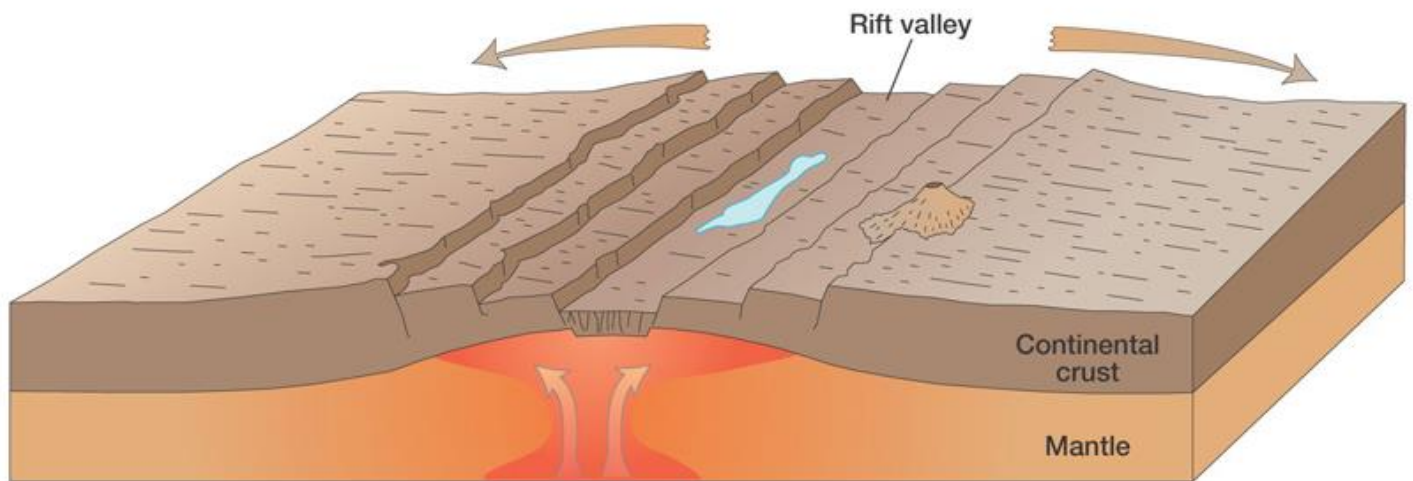
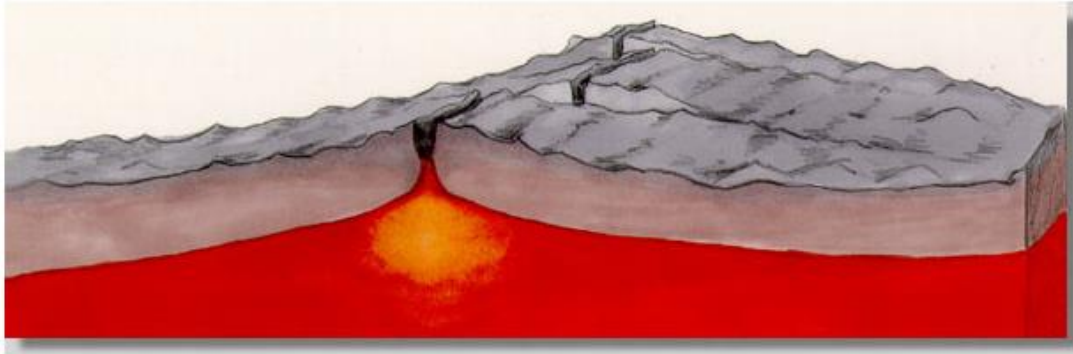
Rift valley

an underwater valley with steep sides in the center of a mid-ocean ridge

On land, spreading plates form steep, wide valleys in the continental crust

Earthquakes and
volcanoes

occur in rift valleys



<http://education.sdsc.edu/optiputer/flash/seafloorspread.htm>

http://www.uwsp.edu/geo/faculty/ritter/animation/lithosphere/tectonics/sea_flr_spread_USGS_A55.gif

http://www.classzone.com/books/earth_science/terc/content/visualizations/es0804/es0804page01.cfm?chapter_no=visualization

Evidence for
seafloor spreading

- magnetic evidence
- age evidence

Earth's magnetic
field

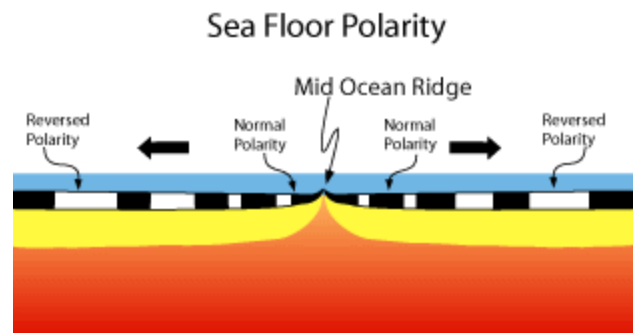
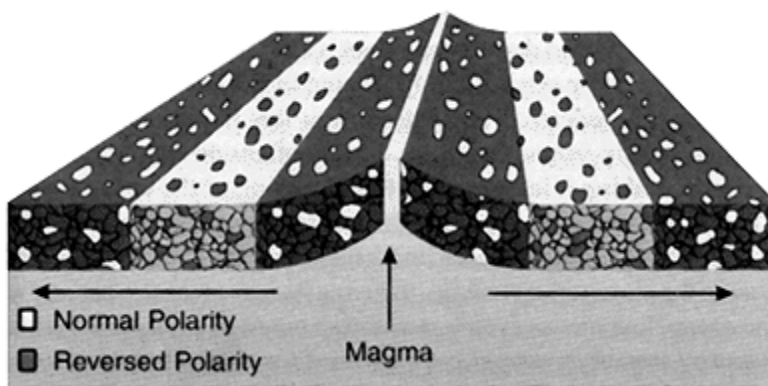
has a north and south pole that
have reversed themselves many
times in the past

Normal polarity

magnetic rocks in the seafloor
match Earth's normal polarity
(compass needle points north)

Reverse polarity

magnetic rocks in the seafloor
match Earth's reverse polarity
(compass needle points south)



As ocean crust forms, it obtains
the polarity of the Earth's
magnetic field at that time

Over time, a series of magnetic
“stripes” are formed on the
seafloor

<http://www.edumedia-share.com/media.php?id=1325>

Mid-ocean ridge

a continuous mountain range on the bottom of the seafloor

It forms where plates are spreading apart



Age evidence

scientists found that the youngest rocks were located at the center of the mid-ocean ridge

The ages of the rocks become increasingly older further from the ridge



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Check Your Understanding

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1. What is the difference between the lithosphere and the asthenosphere?
2. What is GPS and how does it relate to the study of plate tectonics?
3. Describe age evidence that supports the theory of seafloor spreading.
4. Compare and contrast the two types of Earth's crust.